2.0 Alternatives

2.1 Introduction

The FHWA's "Vital Few Goals" include safety, congestion mitigation, and environmental stewardship and streamlining. Throughout the project development process, the natural and human environment is carefully considered while addressing mobility and safety needs of the public. Balancing the transportation needs with social impacts and community concerns as well as ecosystem and habitat conservation needs requires flexibility in the design process, including such things as the use of design exceptions to reduce the footprint of the roadway, and the inclusion of mitigation to offset the impacts of the project.

This chapter describes the No Action Alternative and the three build alternatives that were identified for the Hyampom Road Project during early SEE Team meetings and two public scoping meetings. Alternatives included:

- Alternative 1 - No Action
- Alternative 2 - Reconstruct Existing Alignment
- Alternative 3 - Reconstruct Alternative Forest Service Road
- Alternative 4 - Reconstruct Existing Alignment to Meet Higher Design Standard

An evaluation of engineering, economic, and environmental factors resulted in the selection of two alternatives (Alternatives 1 and 2) for further analysis. These two alternatives are further described in Sections 2.2 and 2.3. Alternatives 3 and 4 were considered early in the project development process but were eliminated from detailed analysis because of greater environmental impacts resulting from construction, and construction costs. These alternatives are briefly discussed in Section 2.4.

As described in Section 1.0, the total route is divided into six segments. The FHWA will reconstruct Segments 2, 4, and 5. The reconstruction of Segments 1 and 3 will be the responsibility of Trinity County. This EA covers Segments 2, 3, 4, and 5.

2.2 Alternative 1 - No Action

The No Action Alternative would leave the Hyampom Road in its existing condition. Under this Alternative, no Forest Highway funds would be available to correct the major deficiencies and maintenance operations would continue at existing levels, which are insufficient to keep up with the roadway deterioration. Deficiencies of the existing road include pavement cracking and weakening, poor drainage, susceptibility to flooding, inadequate substructure, narrow or no shoulders, steep and eroding drop-offs, lack of guardrails in crucial areas, and sharp curves. The roadway is less than two full travel lanes in many sections. Under the No Action alternative, there is also the potential for the road to fail (by a catastrophic event or slipout from inclement weather or continued erosion) leading to possible long-term disruption in access to Hyampom. This Alternative would include ongoing maintenance activities performed by Trinity County with existing maintenance

funds. Since these funds are limited, maintenance activities would be restricted to surface patching, minimal drainage repair, debris removal, and other minor safety improvements that would be short-term in nature and would not provide a long-term solution that addresses the major problems of the present road. Current maintenance funding in Trinity County is inadequate to stabilize the roadway surface from further degradation due to erosion of embankment materials which continues to make the roadway narrower. Trinity County has identified the need for additional funding to stabilize the roadway.

2.3 Alternative 2 - Reconstruct Existing Alignment

This alternative would primarily follow the existing alignment and would improve roadway safety by developing a consistent two-lane roadway with shoulders, reducing the severity of sharp curves, upgrading surface and subsurface drainage systems, replacing one bridge, widening and rehabilitating another bridge, replacing a culvert with a bridge crossing and placing guardrails in strategic locations. In some areas, a paved ditch will be used to facilitate drainage and reduce the overall width of the project disturbance. These project elements are illustrated in Figures 3 through 6 and described further below. The design speed would be 40 km/h (25 mph) for Segment 2 and 30 km/h (20 mph) for Segments 3, 4, and 5. Table 6 tabulates the project needs addressed under the various alternatives. Table 7 details design speed for the segments.

A description of the existing conditions and the proposed roadway improvements for each segment is provided below.

2.3.1 Segment 2

2.3.1.1 Existing Conditions

Segment 2 begins at the National Forest boundary approximately 5.9 km (3.7 mi.) from the intersection with SR 3 (See Figure 2). This segment then extends westerly approximately 4.7 km (3.0 mi.) to Kilometer Post (KP) 10.6 (Milepost [MP] 6.8). Hayfork Creek is adjacent to the roadway for the entire length of this segment. The present width of the roadway segment is approximately 6.4 m (21 ft.). The road in this section is classified as being in "rolling" terrain and is characterized by road pavement rutting, narrow or no shoulders and steep drop-offs along the roadway edge adjacent to Hayfork Creek. Another serious condition is inadequate control of surface water runoff due to too few drainage culverts and flooding during major storm events because the roadway is within the 100-year floodplain. The floodplain analysis indicated that water depths in the 100-year floodplain would overtop Hyampom Road in Segment 2 by up to 3 m (10 ft.) in some locations. There are several private properties along this segment that have structures that are very close to the existing roadway; additionally, there are mining claims posted in various locations along the roadway. The existing bridge at Little Creek is narrow and the bridge rails do not meet current crash standards.

2.3.1.2 Proposed Project

Proposed Project elements in Segment 2 would include raising the roadbed by as much as 3.0 m (10 ft.) to place the roadway above the 100-year flood plain, and replacing and adding drainage culverts to improve surface and subsurface drainage conditions. The roadway

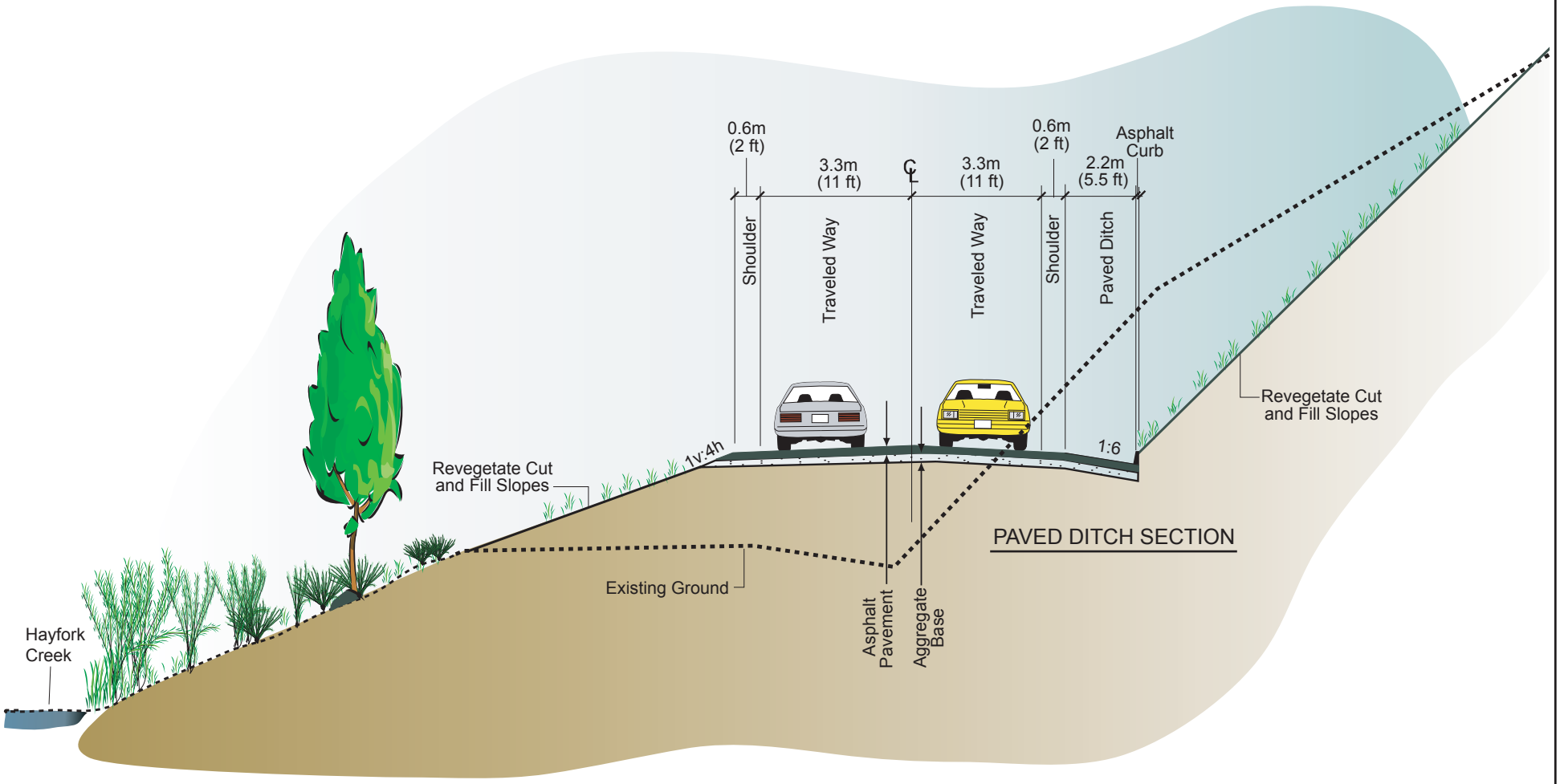

FIGURE 3
TYPICAL PAVED DITCH SECTION
SEGMENTS 2 AND 3
HYAMPOM ROAD PROJECT
TRINITY COUNTY, CALIFORNIA

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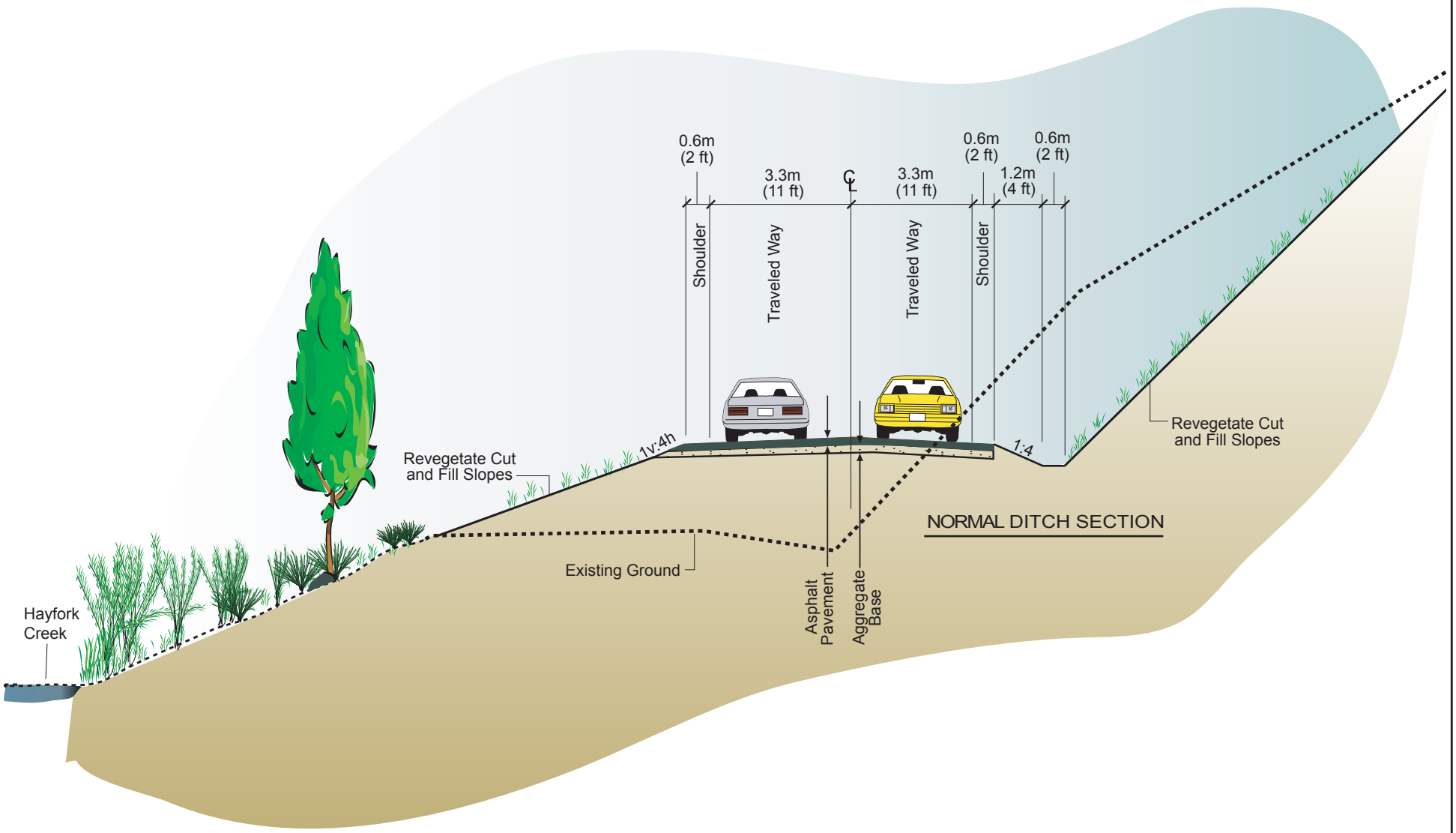

FIGURE 4
TYPICAL NORMAL DITCH SECTION
SEGMENTS 2 AND 3
HYAMPOM ROAD PROJECT
TRINITY COUNTY, CALIFORNIA

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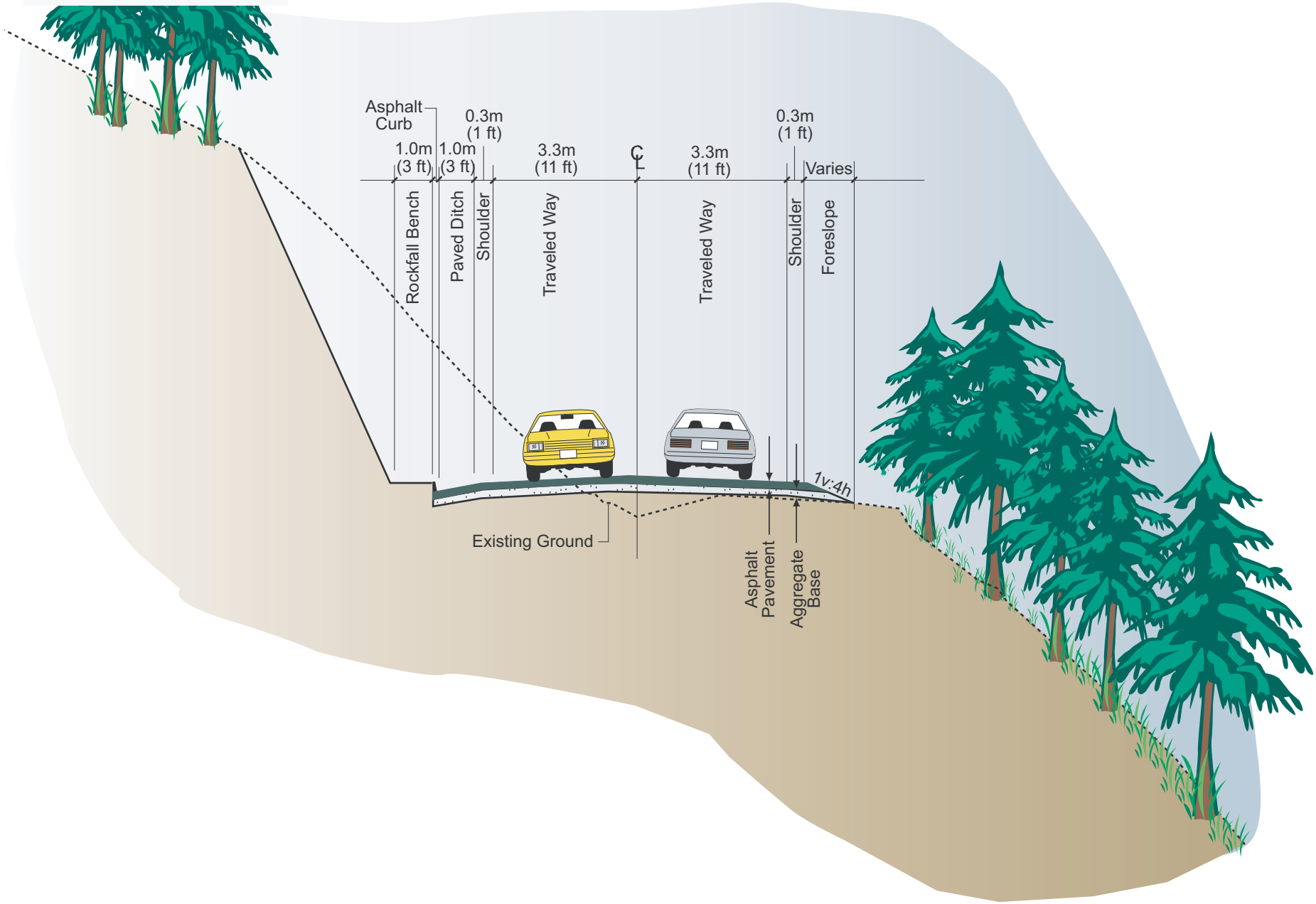

FIGURE 5
TYPICAL SECTION SEGMENTS 4 AND 5
HYAMPOM ROAD
TRINITY COUNTY, CALIFORNIA

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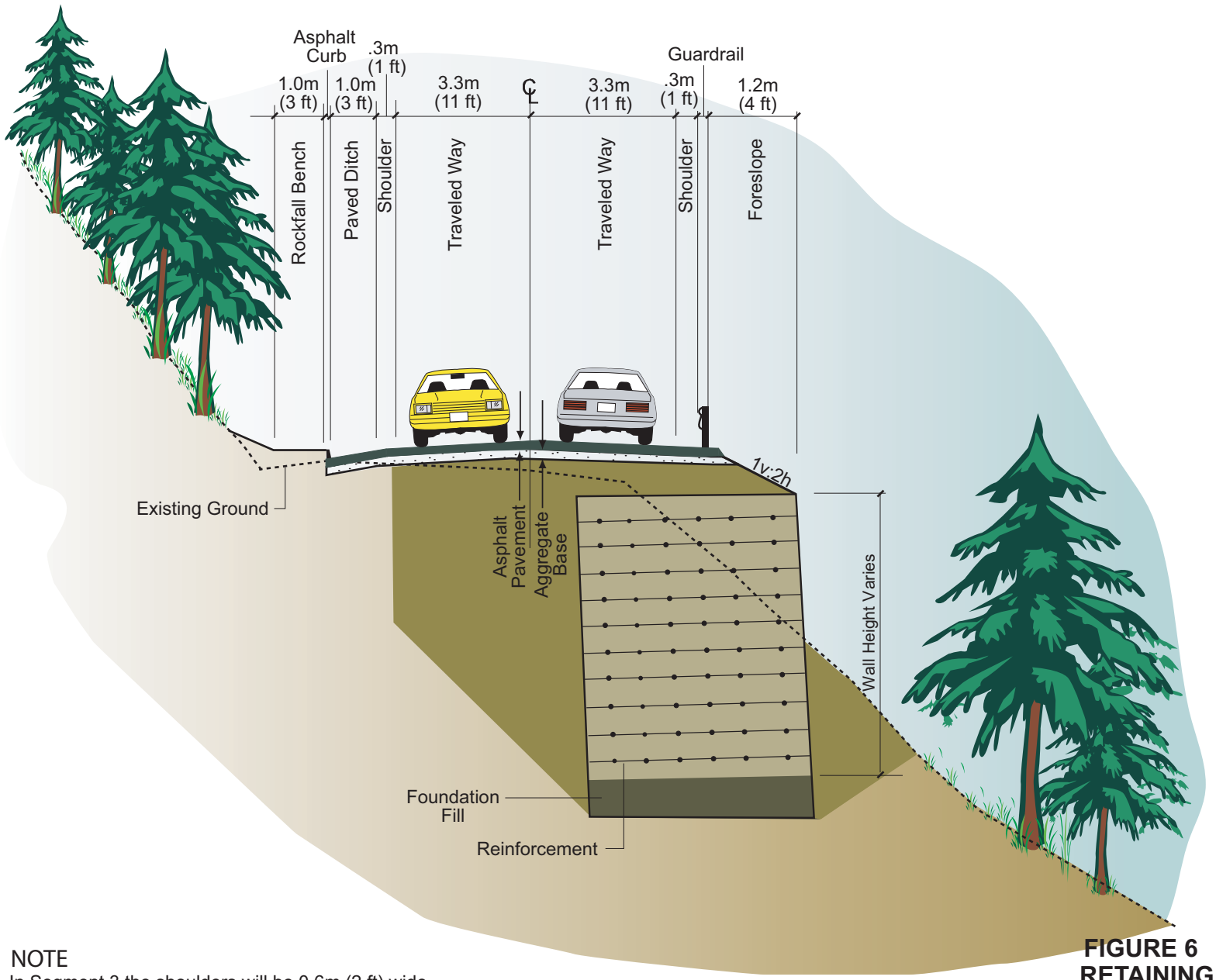

NOTE
In Segment 3 the shoulders will be 0.6m (2 ft) wide

FIGURE 6
RETAINING WALL SECTION SEGMENTS 3, 4, AND 5
HYAMPOM ROAD PROJECT
TRINITY COUNTY, CALIFORNIA

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would remain essentially on the existing alignment and would be widened to 7.8 m (26 ft.), consisting of two 3.3 m (11 ft.) travel lanes and two 0.6 m (2 ft.) shoulders. This is consistent with the width of Trinity County's projects in Segments 1 and 3. Some right-of-way acquisition will be required for Segment 2. See Figures 3 and 7, for examples of the proposed roadway along Segment 2 and 3. The majority of the reconstructed roadway will incorporate the paved ditch section, shown in Figure 3. Some portions of the new road will have normal ditch sections, as depicted in Figure 4. Figures 7 through 10 are based on a 15 percent design. Retaining walls will be constructed in portions of Segment 2. The Proposed Project would also include the replacement of Little Creek Bridge, located at KP 8.8 (MP 5.5). The new bridge would meet current safety and design standards, and would be higher and longer in order to better accommodate flood flows.

2.3.2 Segment 3

2.3.2.1 Existing Conditions

Segment 3 begins at KP 10.6 (MP 6.8) approximately 11 km (7 mi.) west of Hayfork and extends westerly for 2.2 km (1.4 mi) along Hayfork Creek. Segment 3 runs along the north side of Hayfork Creek for most of its length until it crosses the creek on Nine-Mile Bridge at its western terminus. James Creek flows into Hayfork Creek near the eastern end of this segment. The area along this segment is characterized by densely forested steep terrain sloping toward Hayfork Creek.

Deficiencies along Segment 3 include rock failures at existing cut slope locations, localized embankment failures which have reduced the road to less than two lanes, tight-radius curves, insufficient and inconsistent lane and shoulder widths, and localized flooding at the eastern end. The Hayfork Nine-Mile Bridge, constructed by the USFS in 1948, is too narrow to meet current design standards and has a tight curve on the western approach.

2.3.2.2 Proposed Project

Proposed Project elements include widening of the road to two 3.3 m (11 ft.) travel lanes and two 0.6 m (2 ft.) paved shoulders. The existing road profile will be raised at the eastern end of Segment 3 in order to correct flooding problems. To achieve the desired road width will require cuts to be made on the upper slopes adjacent to the roadway and placement of rock slope protection and retaining wall systems. Figures 3 and 6 depict a typical cross section and retaining wall section, respectively, of the roadway for Segment 3.

Another project element is the widening and rehabilitation of the Nine-Mile Bridge to 8.4 m (27.5 ft.), consisting of two 3.3 m (11 ft.) lanes and two 0.6 m (2 ft.) shoulders. The widening will require the addition of a new steel girder, and widening the concrete pier walls and foundations. The bridge will be repainted, the barrier rail replaced, and the deck refinished.

In addition, new single span bridges will replace the existing culverts at James and Jud Creeks. Another option at Jud Creek would be to realign the creek so that it discharges directly to Hayfork Creek upstream of Nine-Mile Bridge without crossing Hyampom Road, eliminating the need for a bridge. Trinity County is currently analyzing whether this is feasible. The Proposed Project also includes replacement of two other culverts that will accommodate 100 year flows along with downspouts or other outlet protection to prevent

erosion of fill slopes. Finally, a walkway will be constructed to provide hikers' access to the Eight Mile Trail, located just east of the Nine-Mile Bridge.

2.3.3 Segment 4

2.3.3.1 Existing Conditions

Segment 4 begins at approximately KP 12.8 (MP 8.3), just past the northwest end of Nine-Mile Bridge and extends westerly for 3.6 km (2.2 mi.). Segment 4 shares many of the same safety and pavement deficiencies (erosion, cracking, etc.) of Segments 2 and 3. It is similar in physical dimensions to Segment 3. This section of Hyampom Road climbs more steeply, hugging the mountain side, which results in winding tight turns as it crosses ravines. Hayfork Creek at this point is east of Hyampom Road, and no longer adjacent to the roadway.

2.3.3.2 Proposed Project

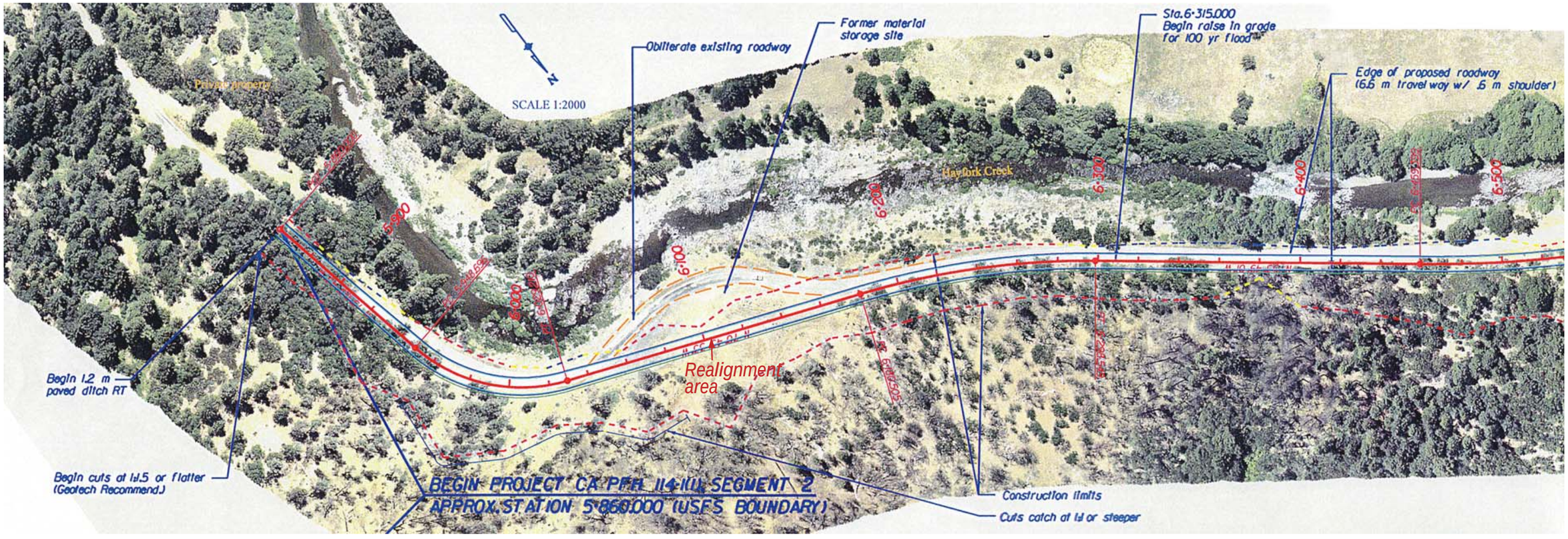
Proposed Project elements would include improving the surface and subsurface drainage conditions and increasing the width of the road to 7.2 m (24 ft.). The roadway reconstruction would consist of a cross-section of two 3.3 m (11 ft.) travel lanes and two 0.3 m (1 ft.) shoulders, slightly less than Segments 2 and 3. Since the terrain in Segment 4 is more mountainous, the shoulder width is reduced (compared to that of Segments 2 and 3) in order to minimize impacts of cuts and fills in this extremely steep terrain. Figures 5 and 6 depict a typical cross section and retaining wall section, respectively, of the roadway for Segment 4.

Although the Proposed Project would generally follow the existing roadway alignment, existing narrow areas would be widened and sharp curves softened, necessitating large cuts on the upper slopes adjacent to the roadway and filling in gullies at existing sharp turns and switchbacks. For Segment 4, Figure 8 depicts how the tight curves will be less severe in the new alignment, and Figure 9 illustrates one proposed ravine crossing. The gullies would be partially built up with cut material to reduce the severity of the switchback curves in the roadway alignment, and to dispose of excess material generated by the roadway excavation. In some locations, retaining walls may be built to provide the necessary width for roadway construction. The most significant retaining wall construction will occur in Segments 4 and 5. In critical locations, where additional safety measures are warranted, the roadway would be widened to accommodate guardrails. Guardrails would also be placed along all retaining walls.

2.3.4 Segment 5

2.3.4.1 Existing Conditions

Segment 5 is a narrow, single-lane roadway that begins at approximately KP 16.4 (MP 10.2) just east of Dinner Gulch and extends westerly for 5.6 km (3.5 mi.) where it widens back to two lanes. The narrowness of the roadway requires vehicles to pull partially off the roadway and/or stop when they encounter vehicles traveling in the opposite direction. Often, no pullouts are available and a vehicle may have to back up to a place with adequate width. The lane and roadway width in Segment 5 are much narrower than in Segments 2, 3, and 4. The narrowest location has only 3.0 m (10 ft.) of pavement width, and widths range



Note: Realignments in Segment 3 are similar to those shown here.

FIGURE 7
EXAMPLE REALIGNMENT IN PLAN VIEW FOR SEGMENTS 2 AND 3
FIGURE DERIVED FROM 15% PLANS
HYAMPOM ROAD
TRINITY COUNTY, CALIFORNIA

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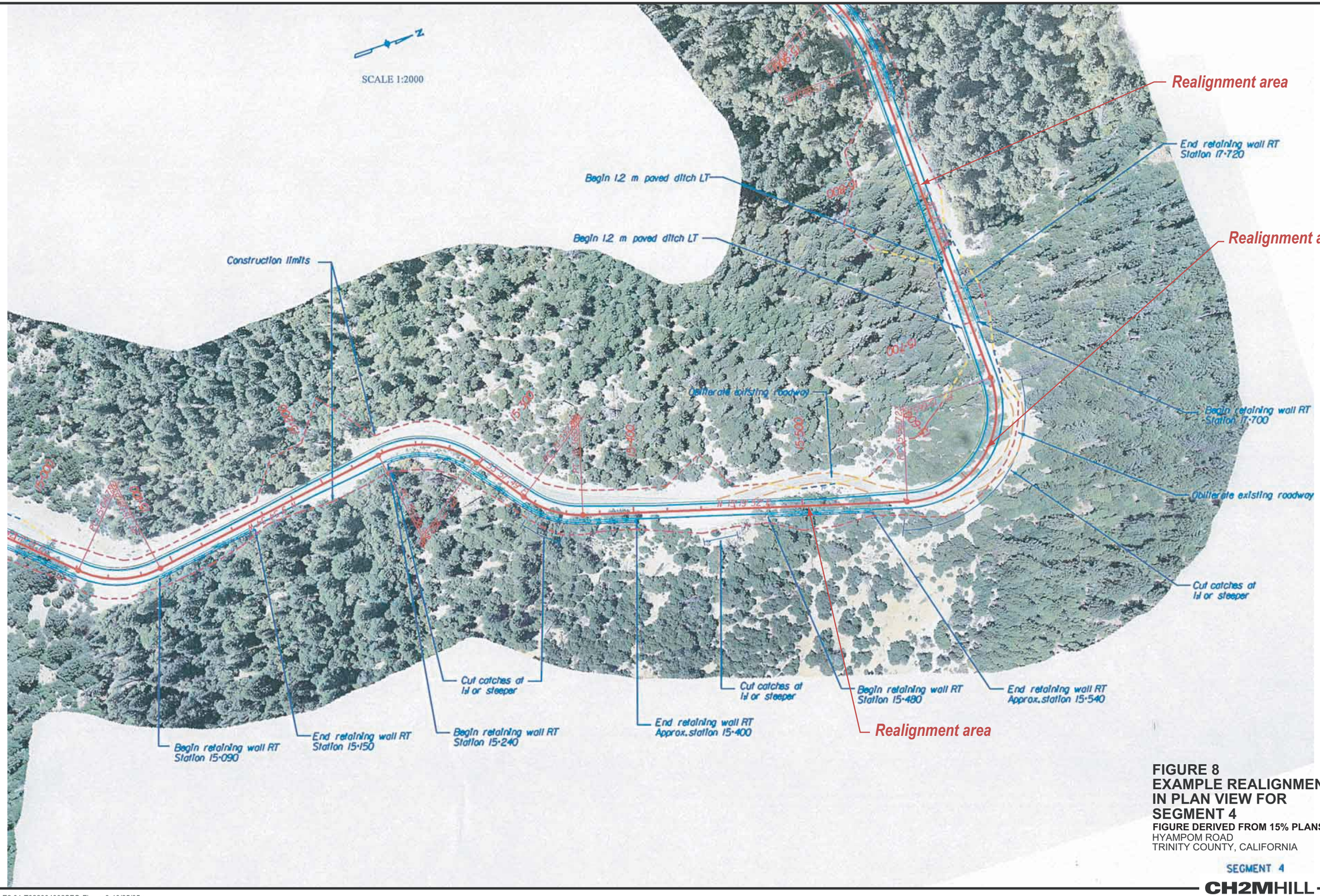

FIGURE 8
EXAMPLE REALIGNMENT IN PLAN VIEW FOR SEGMENT 4
FIGURE DERIVED FROM 15% PLANS
HYAMPOM ROAD
TRINITY COUNTY, CALIFORNIA

SEGMENT 4

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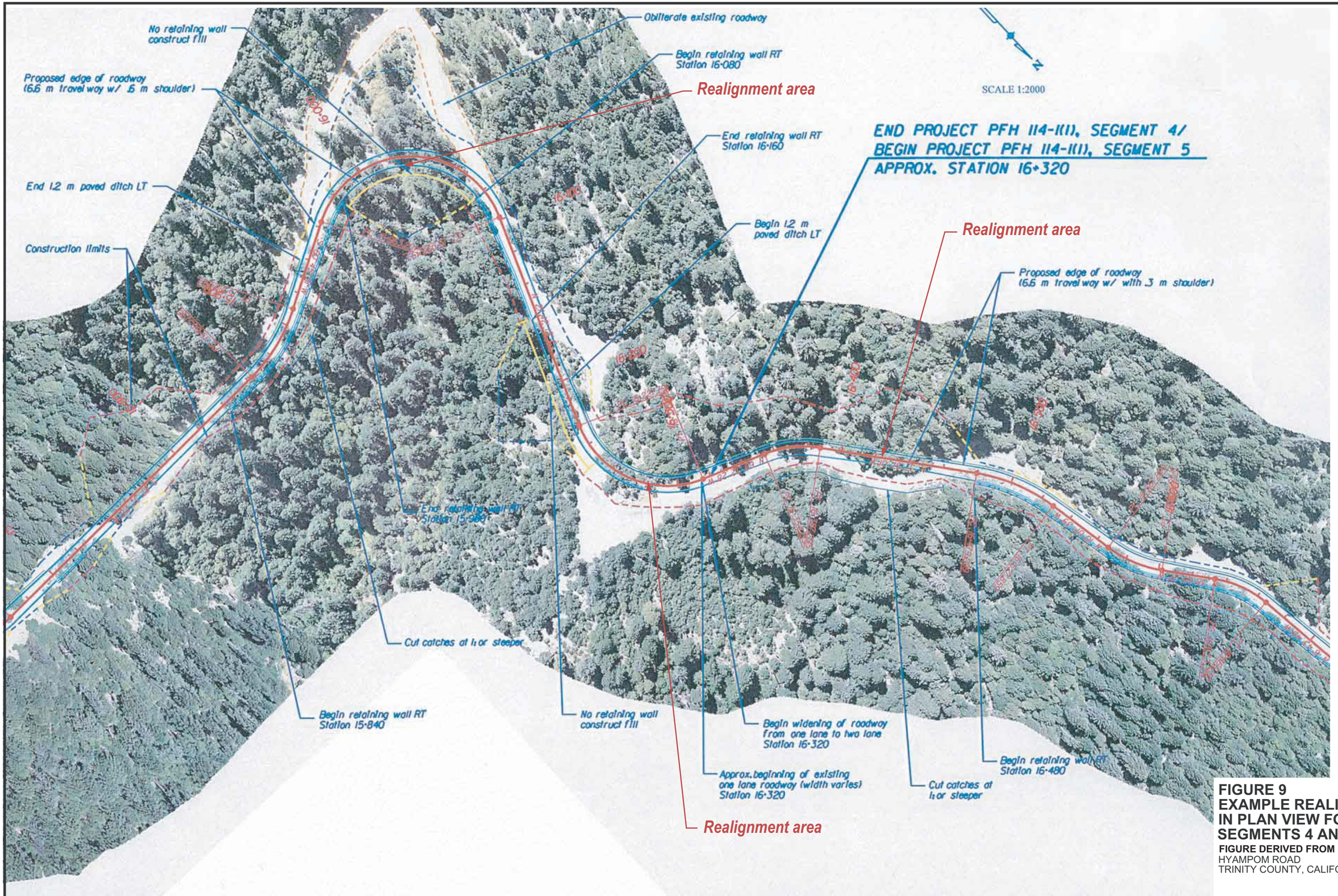

FIGURE 9
EXAMPLE REALIGNMENT IN PLAN VIEW FOR SEGMENTS 4 AND 5
FIGURE DERIVED FROM 15% PLANS
HYAMPOM ROAD
TRINITY COUNTY, CALIFORNIA

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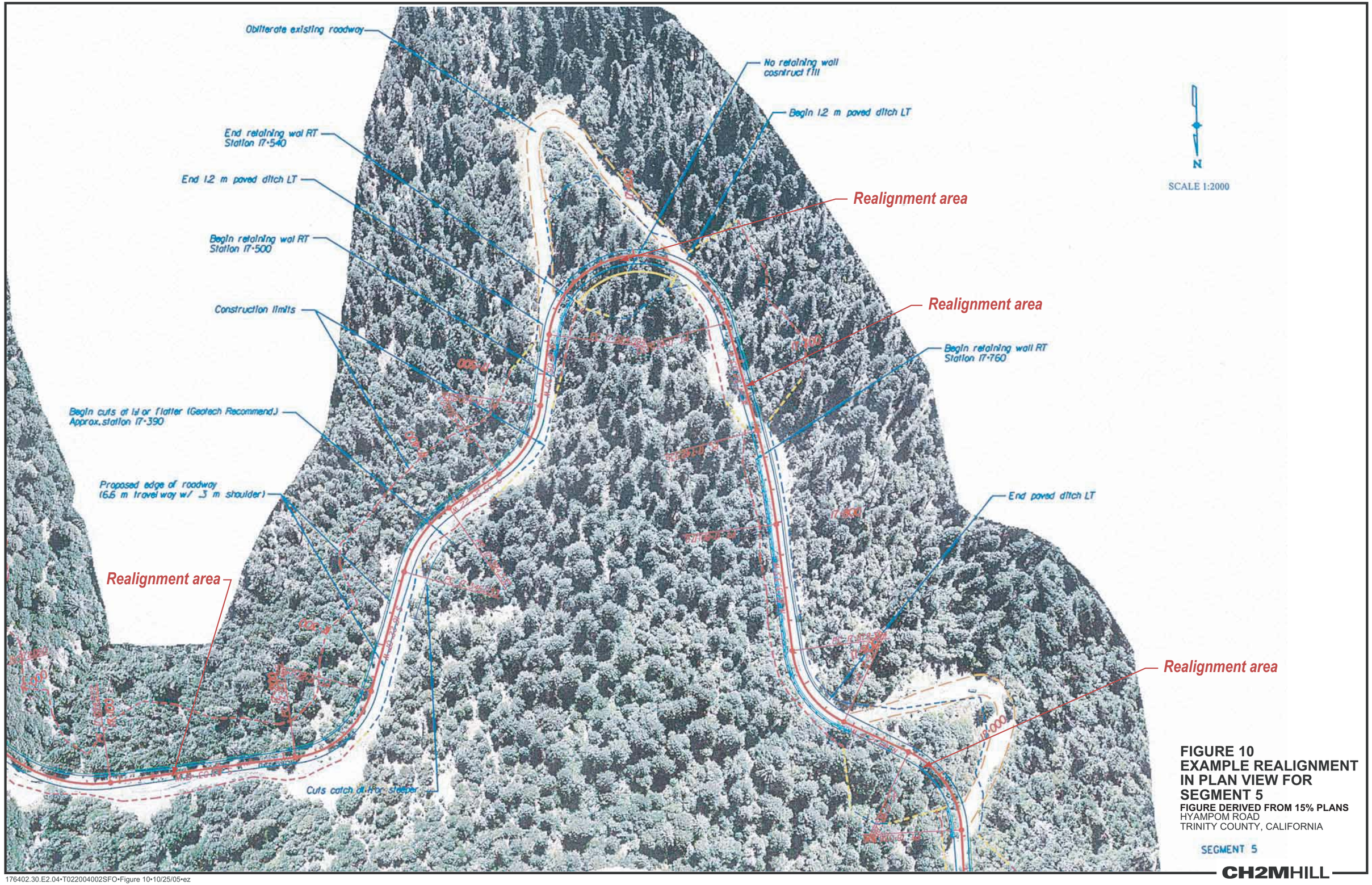

FIGURE 10
EXAMPLE REALIGNMENT IN PLAN VIEW FOR SEGMENT 5
FIGURE DERIVED FROM 15% PLANS
HYAMPOM ROAD
TRINITY COUNTY, CALIFORNIA

SEGMENT 5

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up to 5.5 m (18 ft.). This segment has many of the same roadway deficiencies as Segments 2, 3, and 4; in addition, Segment 5 is situated on a near vertical cliff, and has many more sharp horizontal curves, areas with limited sight distance and no guardrails. The narrow one-lane configuration, rocks and debris on the roadway, roadside hazards, and steep drop-offs adjacent to the roadway create a very precarious driving situation. Due to the overly steep slopes, the outside edge of the roadway is eroding and the roadway continues to get narrower.

2.3.4.2 Proposed Project

Similar to Segment 4, the Proposed Project would widen the roadway to 7.2 m (24 ft.), including two 3.3 m (11 ft.) travel lanes with two 0.3 m (1 ft.) shoulders, slightly less than Segments 2 and 3. Since the terrain in Segments 4 and 5 is more mountainous, the shoulder width is reduced (compared to that of Segments 2 and 3) in order to minimize impacts of cuts and fills in this extremely steep terrain. The Proposed Project elements would be similar to those discussed for Segment 4; however, because the existing road is extremely narrow, on a near-vertical cliff, more cuts and retaining wall construction would be necessary. The most significant retaining wall construction will occur in Segments 4 and 5. In order to construct a consistent two-lane roadway, the Proposed Project would require cuts on the upper slopes adjacent to the roadway, and filling in portions of the ravines to provide the needed width and reduce the severity of sharp turns and switchbacks. Figures 5 and 6 depict a typical cross section and retaining wall section, respectively, of the roadway for Segment 5. See Figure 10 for examples of Proposed Project elements along Segment 5. This segment will also require the construction of soil nail walls (see Figure 11 for examples of soil nail wall construction with aesthetic treatment). In critical locations where additional safety measures are warranted, the roadway would be widened to accommodate guardrails. Guardrails would also be placed along all retaining walls.

TABLE 6
Project Needs Addressed by Proposed Project Under Reconstruct Existing Alignment Alternative

Segments 2 and 3	Segment 4	Segment 5
Roadway Deficiencies	**Roadway Deficiencies**	**Roadway Deficiencies**
• Provide adequate lane and shoulder width	• Provide adequate lane and shoulder width	• Provide a lane in each direction and adequate shoulder width
• Raise roadway out of the 100-year floodplain		
• Providing adequate pavement structure would better support vehicle traffic, avoiding the pavement distress seen on the existing road	• Providing adequate pavement structure would better support vehicle traffic, avoiding the pavement distress seen on the existing road	• Providing adequate pavement structure would better support vehicle traffic, avoiding the pavement distress seen on the existing road
• Correcting or stabilizing steep drop-off along edge of pavement near Hayfork Creek would reduce erosion and narrowing of the roadway	• Correcting or stabilizing steep drop-off along edge of pavement in many areas would reduce erosion and narrowing of the roadway and the potential for rock fall	• Correcting or stabilizing steep drop-off along edge of pavement in many areas would reduce erosion and narrowing of the roadway and the potential for rock fall
• Gentler curves would smooth roadway alignment	• Gentler curves would smooth roadway alignment	• Gentler curves would smooth roadway alignment
• Improved drainage would reduce erosion	• Improved drainage would reduce erosion	• Improved drainage would reduce erosion

TABLE 6
Project Needs Addressed by Proposed Project Under Reconstruct Existing Alignment Alternative

Segments 2 and 3	Segment 4	Segment 5
Maintenance Issues		
• By correcting erosion of shoulders, structural section, pavement cracking, debris on roadway, and improving control of surface water runoff, maintenance requirements would be greatly reduced		
Safety	**Safety**	**Safety**
• Inadequate lane and shoulder widths would be corrected	• Inadequate lane and shoulder widths would be corrected	• Providing a lane in each direction would better accommodate two-way operations and reduce the potential for head-on vehicle conflicts
• Gentler curves would smooth roadway alignment and increase sight distance	• Gentler curves would smooth roadway alignment and increase sight distance	• Gentler curves would smooth roadway alignment and increase sight distance
• Steep drop-off along edge of pavement in many areas would be improved	• Steep drop-off along edge of pavement in many areas would be improved	• Steep 30-m (100 ft.) drop offs with no guardrail along edge of pavement in many areas would be improved
• Improved drainage would reduce erosion and further narrowing of the roadway	• Improved drainage would reduce erosion and further narrowing of the roadway	• Improved drainage would reduce erosion and further narrowing of the roadway
• Roadway would be raised out of the 100-year floodplain	• Stabilizing slopes would reduce the potential for rock fall on the roadway	• Stabilizing slopes would reduce the potential for rock fall on the roadway
Social and Economic Considerations	**Social and Economic Considerations**	**Social and Economic Considerations**
• Improved and widened roadway would accommodate local residents, commercial and local business activity, and forest accessibility	• Improved and widened roadway would accommodate local residents, commercial and local business activity, and forest accessibility	• Improved and widened roadway would accommodate local residents, commercial and local business activity, and forest accessibility
• Less travel interruption due to flooding	• Less travel interruption due to rock fall and slipouts	• Less travel interruption due to rock fall and slipouts
• Prevent loss of additional roadway width, which could eliminate safe passage altogether		• Prevent loss of additional roadway width, which could eliminate safe passage altogether
Forest Resource Management		
• Roadway would better assist USFS with resource and ecosystem management, and accommodate forest users		
• Roadway would accommodate seasonal visitors, recreational users of the forest, and visitors to Hyampom		

Source: FHWA, 1999, 2001

FIGURE 11a
Example of a wall faced with aesthetic treatment constructed by FHWA along Highway 36 east of Mad River

FIGURE 11b
Another example of a soil nail wall with aesthetic treatment

FIGURE 11
EXAMPLE NAIL WALL
HYAMPOM ROAD
TRINITY COUNTY, CALIFORNIA

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TABLE 7
Proposed Project Design Speed by Roadway Segment

Segment	Terrain	Design Speed	Design Exceptions	Lane Width (m/ft.)	Shoulder Width (m/ft.)	Paved Ditch (m/ft.)
2	rolling	40 km/h (25 mph)	Yes	3.3/11	0.6/2	1.7/5.5
3	mountainous	30 km/h (20 mph)	No	3.3/11	0.6/2	1.7/5.5
4	mountainous	30 km/h (20 mph)	No	3.3/11	0.3/1	0.9/3
5	mountainous	30 km/h (20 mph)	No	3.3/11	0.3/1	0.9/3

2.4 Alternatives Considered But Eliminated

Early in the development of the Hyampom Road Project, four alternatives were identified. Alternatives 3 and 4 were not carried forward for more detailed evaluation for the reasons presented below.

2.4.1 Alternative 3 – Reconstruct Alternative Forest Service Road

Alternative 3, depicted in Figure 12, was considered early in the Proposed Project as an alternate alignment in order to avoid the extremely steep terrain of Segments 4 and 5 and to reduce the travel impacts on Hyampom residents during construction. This existing Forest Development Road is narrow and winding with steep grades, and consists of a gravel and dirt road. After further evaluation, it was determined that this alternative would face many of the same difficulties that exist on the current alignment, such as steep terrain and poor existing roadway alignment. In addition, this alternative would result in greater environmental impacts and higher construction costs. The route is longer than the existing alignment, and it would also require higher maintenance and snow removal costs once the roadway was built because it is located at much higher elevations. For Segments 4 and 5, this alternative would relocate the roadway to a new, more stable alignment. This alignment would probably tie into the Alternative alignment for Segments 2 and 3, rather than into the existing alignment. Although the exact location is undetermined, it would be upslope away from Hayfork Creek. The new alignment would tie into the existing road near James Creek or Nine-Mile Bridge, possibly requiring a new bridge at this location. This new alignment would result in greater disturbance of geologic and topographic features during construction and grading since the new road would be built on previously undisturbed ground. For the above reasons (increased environmental impacts to forest habitat and topographic features and increased construction costs), this alternative was eliminated early in the Project design process.

2.4.2 Alternative 4 – Reconstruct Existing Alignment to Meet Higher Design Standard

Alternative 4 would provide wider shoulders and smoother alignment than that proposed for Alternative 2. This option would provide two 3.3 m (11 ft.) travel lanes and two 0.6 m (2

ft.) shoulders for a design speed of 50 km/h (30 mph) throughout Segments 2, 3, 4, and 5. This option was eliminated due to greater environmental impacts caused by the wider shoulder and smoother alignment. Wider shoulders would require higher cuts and larger fills in the road which result in more environmental impacts to existing slopes and vegetation. Higher design speeds require straightening the curves in the road necessitating more disturbance of forest habitat further away from the existing roadway alignment. As a result, more areas would require cut and fill operations that would disturb more natural forest habitat and vegetation and expose more surfaces to erosion.

The narrower shoulders provided in Segments 4 and 5 for Alternative 2 would adequately address the Proposed Project purpose to provide a consistent two lane-width roadway alignment, and to enhance the safety of current and future traffic. Additionally, the low traffic demand for this road now and in the future does not warrant higher design standards and speed. Finally, the public input received from local residents and community members to date is to minimize the road width and cuts and fills and preserve as much as practicable the natural beauty and character of the Hyampom Road corridor. For the above reasons, this alternative was eliminated early in the Project design process.

2.4.3 Alternative 5 – Bridging Ravines in Segments 4 and 5

Alternative 5 would include bridges across the ravines in Segments 4 and 5, rather than the currently proposed fills. This would reduce the visual impacts of the ravine fills. This option was eliminated due to the need for a location to place the large volume of material generated by the Proposed Project. In order to provide two lanes through Segment 5, and due to the steepness of the terrain, large cuts into the hillside will be necessary. These cuts will generate approximately 200,000 cubic meters (m^3) (250,000 cubic yards) of material, or almost 30,000 truckloads. If the material had to be removed from the project area, another location would need to be found to place the material. At this time, there are no known locations that will accept this large volume of material. In addition, the environmental impacts to the new location and the impacts of the truck traffic traveling through Hayfork or Hyampom could be significant.

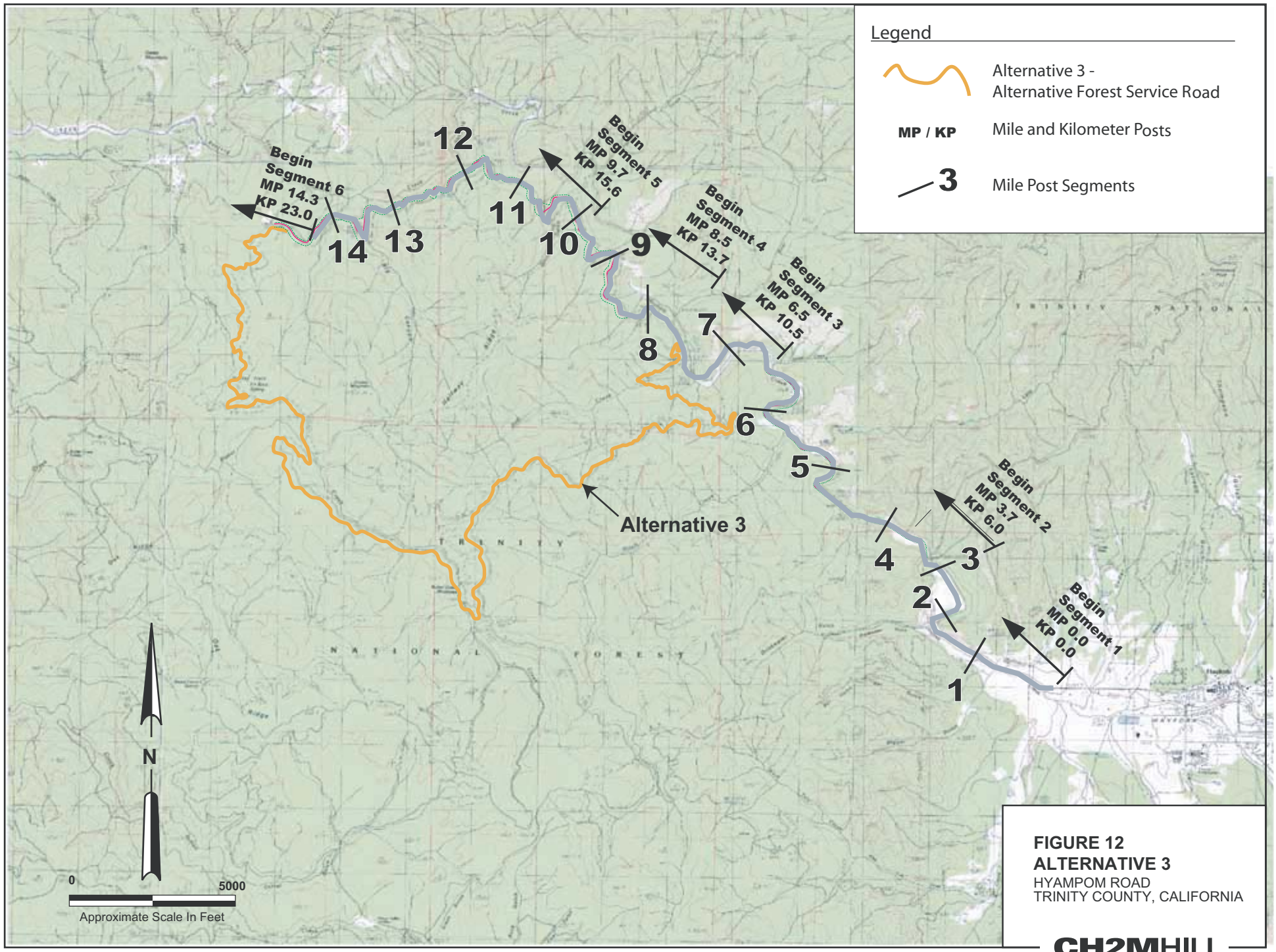

FIGURE 12
ALTERNATIVE 3
HYAMPOM ROAD
TRINITY COUNTY, CALIFORNIA

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